

Mother-Child Patterns of Coping With Anticipatory Medical Stress

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Maternal influences on children's fear and coping behaviors during a medical examination were studied in a pediatric outpatient clinic using the Dyadic Prestressor Interaction Scale (DPIS) to measure anticipatory reactions just prior to contact with the physician. Analysis of 50 mother-child dyads, including children from 4 to 10 years of age, revealed that the behaviors emitted by mother and child are likely to influence the child's ability to tolerate the medical experience. Maternal use of distraction and low rates of ignoring were associated with lower child distress and increased prosocial behaviors. Children's active exploration of the situation was more likely to occur when mothers provided their children with information, and was less likely when mothers reassured their children. Maternal reassurance of children and overt maternal agitation were associated with more maladaptive child responses. Age trends were also found in interactive patterns. Younger children were more likely to receive reassurance from mothers when they showed attachment. There was a stronger association between mother's information giving and child's exploring for children under 5 years, 9 months of age. Results supported the usefulness of the DPIS for investigation of child management techniques in this situation. Theoretical extension to attachment and stranger-approach situations was made. Suggestions for future studies to clarify the reciprocity of interactions or to determine causal direction between mother and child behaviors, as well as to evaluate the specificity or generality of these findings, were provided.

Key words: anticipatory medical stress, coping, Dyadic Prestressor Interaction Scale (DPIS), mother-child dyad

Each year 5,000,000 American children undergo medical procedures for diagnosis or treatment. As many as one third of these children will show some evidence of long-term psychological adjustment problems as a result (Davies, Butler, & Goldstein, 1972). There is conflicting evidence as to whether the presence of the parent, usually mother, is helpful or exacerbates the child's anxiety (Gross, Stein, Levin, Dale, & Wojnilower, 1983; Shaw & Routh, 1982; Vernon, Foley, & Schulman, 1967). As many as half all parents who have a child hospitalized report that their anxiety is so overwhelming that it seriously interferes with their efforts to help their children cope (Gofman, Buckman, & Schade, 1957). Studies in which specific interventions have been utilized with the parent during or in preparation for stressful pediatric medical or dental procedures often have been successful in reducing parental anxiety (Visintainer & Wolfer, 1975; Wright, Alpern, & Leake, 1973), but have not been consistent in demonstrating concomitant improvements in children's responses (Peterson, Ridley-Johnson, Tracy, & Mullins, 1984; Pinkham & Fields, 1976). It remains unclear what specific parenting behaviors enhance children's responses to medical stressors, how situation- and child-specific these effective parenting behaviors are, and how their emission is related to parental anxiety and other variables. The lack of a measure of parent-child interactive behaviors based on observational data has hindered the evaluation of parental functioning in stressful medical situations. One such situation that is particularly common and amenable to assessment is the time parents and children spend in the clinical treatment room waiting for the examining pediatrician.

The purpose of the present investigation was to provide a quantitative measure of patterns of parent-child interaction, to test the reliability and validity of this instrument in a medical setting, and to test hypotheses regarding the adaptiveness of certain parent-child interaction patterns.

The child categories developed were chosen for theoretical relevance to the attachment literature (Bretherton & Ainsworth, 1974) because recent studies (Arend, Gove, & Sroufe, 1979; Sroufe, Fox, & Pancake, 1983) suggest a continuity of the quality of early mother-child interactions with older children's competence in problem solving. The empirical literature on parents' child management styles as they relate to children's fear development and independence was used to select categories of parenting (Zabin & Melamed, 1980).

Despite a recognition of the Emotional Contagion Hypothesis (Escalona, 1953), few studies have quantified what parents actually do with their chil-

dren in stressful situations, and the correlations of parental self-reports with children's fear have been inconsistent. Therefore, we chose to study parent-child interaction immediately prior to an impending stressful event, consultation with a tertiary care physician, to investigate the crisis theory notion that in times of stress, anxiety may have a particularly disorganizing effect on parents' ability to facilitate their children's coping (Duffy, 1972; Kaplan, Smith, Grobstein, & Fischman, 1973; Skipper, Leonard, & Rhymes, 1968).

Our predictions were that, consistent with the idea of emotional contagion, mothers who displayed more anxious behavior while awaiting the physician would have children who also would show more anxiety-related behavior. Following the literature on children's behavior in a strange situation (Greenberg & Marvin, 1982), we also predicted that children who were distressed would show more attachment and fewer exploratory and prosocial behaviors. Finally, following crisis theory, we predicted that more anxious mothers would engage in fewer behaviors oriented toward the facilitation of active child coping (i.e., information provision and distraction). On the other hand, we also predicted that mothers who functioned effectively in this situation (facilitating active child coping rather than emphasizing emotional expression by providing reassurance or themselves acting agitated, or ignoring their children) would have children who would in fact show less distress and cope better (more exploration and prosocial behaviors).

We also sought to examine the effects of maternal trait anxiety and coping style on these interactions, predicting that children whose mothers were less trait anxious and who used more problem-focused coping would fare better. This prediction, also derived from crisis theory, was based upon the expectation that these mothers would show the most organized parenting strategies, facilitative of active child coping in the stressful situation. We anticipated, however, that questionnaire measures of maternal disposition would account for relatively little of the variance in observed mother-child interactions.

Developmental studies (Gross et al., 1983; Gutstein & Tarnow, 1983; Hyson, 1983; Shaw & Routh, 1982) of children's fear, particularly in medical situations, led to our hypotheses that younger children (4 to 6 years) would elicit different parenting behaviors from their mothers (Bell, 1979) and show less independence from their parents in the quality of their adaptation to the stressful situation than children over six years of age.

METHOD

Subjects

Fifty dyads consisting of 4- to 10-year-old children being seen in the Pediatric Surgery, Urology, Infectious Diseases, and Gastroenterology outpatient

clinics at Shands Teaching Hospital and their mothers served as subjects. Children with severe chronic disabilities (mental retardation, functional loss of a limb or sensory modality, terminal illness) and children accompanied in the examining room by anyone other than the mother were excluded. Shands is a tertiary care center; therefore, children seen in the clinic are referred for nonroutine treatment or diagnostic procedures. Subjects were drawn from both rural and urban environments and ranged from lower to upper-middle socioeconomic status. A small number of potential subjects (fewer than 10) declined to participate, in most cases because of an objection to being videotaped.

Measures

Self-report. Self-report measures of anxiety were administered to mothers and children prior to their entry into the examination rooms. Mothers were given the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970). Both mothers and children were given the Hospital Fears Rating Scale (Melamed & Siegel, 1975) to measure current fearfulness of medically related stimuli. Mothers also were asked to rate their own and their children's current anxiety levels, as well as the overall level of stress they had experienced in connection with their child's current health problem, on 4-point scales presented during a structured interview.

The Coping Questionnaire (Billings & Moos, 1981) was used as a measure of the focus of mothers' coping efforts. Items consist of behaviors that mothers rated in terms of how often they had engaged in each in handling their child's current health problem. Two independent dimensions of coping were measured: problem-focused (seeking information, problem solving) and emotion-focused (affective regulation, emotional discharge, resigned acceptance).

Background demographic and medical information was obtained from mothers by means of a short structured interview form. Mothers also were asked to rate, on 4-point scales ranging from *very poorly* to *very well*, their children's reactions to previous medical visits as well as their expectations of how the child would handle the current visit.

Behavioral. An observational scale of mother-child interactions in the clinic examination room, the Dyadic Prestressor Interaction Scale (DPIS), was constructed on the basis of theoretically related literature and extensive observation in the Shands Pediatric Outpatient Clinics. This instrument measured child behaviors found to be of importance in the attachment and separation/stranger anxiety literature (Bretherton & Ainsworth, 1974) and parent behaviors implicated in research as affecting child behaviors (Melamed & Bush, 1985). Four classes of functionally related child behaviors and

six of maternal behaviors were selected, with four specific behaviors operationally defined within each class.

Four classes of child behavior (attachment, distress, exploration, and prosocial) were based on Bretherton and Ainsworth's (1974) functional systems of behavior in a strange situation. These authors reported identifying regular interaction patterns in observations of 1- to 2-year-olds. In particular, they found that manifest behaviors associated with activation of the infant's fear-wariness system center around expressions of distress and avoidance of the "strange" stimuli. They also found that, often, the attachment system was activated simultaneously with fear-wariness, and that affiliative approaches to the stranger and exploration of the physical environment appear to represent activation of two other systems that may conflict or alternate with fear-wariness/attachment activation. This model for infants' responses to a stranger has provided the basis for predictions of security of attachment (Londerville & Main, 1981) and various indexes of children's later social competence (Matas, Arend, & Sroufe, 1978; Sroufe et al., 1983) and has been seen by some researchers (e.g., Kendon, 1970) as characteristic of humans at all ages. The older and broader age range represented in the current study presented an opportunity to evaluate empirically the applicability of these behavior classes to older children and to examine age trends in their systematic relationships.

As suggested by these and other findings (e.g., Arend et al., 1979), exploration and prosocial behaviors were defined operationally (as shown in Table 1) to include adaptive coping with the medical situation. The exploration category includes the child's attempts to get information about the medical situation, while the prosocial category includes both interactive and solitary behaviors that are socially appropriate but are not related specifically to the medical situation. The latter category might be thought of as consistent with attentional focus away from the stressful aspects of the situation, and as representing functioning which is sufficiently free from disruption or disorganization so as to allow "normal" engagement in play or conversational activities. Distress was defined to represent a more maladaptive response, and attachment as representing a coping response possibly stemming from distress, which may be adaptive or not depending upon the mother's ability to respond facilitatively. In order to adapt these categories to the age range (4-10 years) used in the present study, four new face-valid constituent items for each class were based on the first author's prior observational records. Items were selected on the basis of objective observability, regularity of occurrence, and representation of verbal and motor behavior modalities.

Parent behavior classes on the DPIS represent dimensions of parenting behavior shown by past research to be related to children's adjustment in stressful medical situations, and which correspond to the structures and social learning assumptions implicit in the types of parent-focused programs

TABLE 1
Dyadic Prestressor Interaction Scale: Functional Definitions

Child behavior categories

Attachment

- Look at parent: child looking at parent
- Approach parent: child motorically approaching parent
- Touch parent: child physically touching parent
- Verbal concern: child verbalizing concern with the parent's continuing presence throughout the procedures

Distress

- Crying: child's eyes watering and/or the child is making crying sounds
- Diffuse motor: child running around, pacing, flailing arms, kicking, arching, engaging in repetitive fine motor activity, and so forth
- Verbal unease: child verbalizing fear, distress, anger, anxiety, and so forth
- Withdrawal: child silent and immobile, no eye contact with parent, in curled-up position

Exploration

- Motoric exploration: child locomoting around room, visually examining
- Physical manipulation: child handling objects in room
- Questions parent: child asking parent a question related to doctors, hospitals, and so forth
- Interaction with observer: child attempting to engage in verbal or other interaction with observer

Prosocial

- Looking at book: child is quietly reading a book or magazine unrelated to medicine or looking at its pictures
- Other verbal interaction: child is verbally interacting with parent on topic unrelated to medicine
- Other play: child playing with parent, not involving medical objects or topics
- Solitary play: child playing alone with object brought into room, unrelated to medicine

Parent behavior categories

Ignoring

- Eyes shut: parent sleeping or has eyes shut
- Reads to self: parent reading quietly
- Sitting quietly: parent sitting quietly, not making eye contact with child
- Other noninteractive: parent engaging in other medically unrelated solitary activity

Reassurance

- Verbal reassurance: parent telling child not to worry, that the child can tolerate the procedures, that it will not be so bad, and so forth
- Verbal empathy: parent telling child he or she understands the child's feelings, thoughts, situation; questions child for feelings
- Verbal praise: parent telling child that the child is mature, strong, brave, capable, doing fine, and so forth
- Physical stroking: parent petting, stroking, rubbing, hugging, kissing child

Distraction

- Nonrelated conversation: parent engaging in conversation with child on unrelated topic
- Nonrelated play: parent engaging in play interaction with child unrelated to medicine
- Visual redirection: parent attempting to attract child's attention away from medically related object(s) in the room
- Verbal exhortation: parent telling child not to think about or pay attention to medically related concerns or objects

TABLE 1 (Continued)

Restraint

- Physical pulling: parent physically pulling child away from an object in the room
- Verbal order: parent verbally ordering child to change the child's current activity
- Reprimand, glare, swat: parent verbally chastising, glaring at, and/or physically striking child
- Physically holds: parent physically holding child in place, despite resistance

Agitation

- Gross motor: parent pacing, flailing arms, pounding fists, stomping feet, and so forth
- Fine motor: parent drumming fingers, tapping foot, chewing fingers, and so forth
- Verbal anger: parent verbally expressing anger, dismay, fear, unease, and so forth
- Crying: parent's eyes watering, verbal whimpering, sobbing, wailing

Informing

- Answers questions: parent attempting to answer child's medically relevant/situationally relevant questions
- Joint exploration: parent joining with child in exploring the room
- Gives information: parent attempting to impart information, unsolicited by child, relevant to medicine/the current situation, to the child
- Prescribes behavior: parent attempting to describe to the child appropriate behaviors for the examination session

currently in use (Melamed & Bush, 1985). The classes were informing, distracting, reassuring, ignoring, restraining, and agitation. Informing and distracting were defined to include behaviors found to facilitate children's active coping in stressful medical situations (Heffernan & Azarnoff, 1971; Melamed, 1981; Opton, 1969). Reassurance, while conceptualized as a maternal behavior oriented toward facilitation of children's emotional expression, has less clear implications for children's adjustment. It was anticipated, on the basis of previous research (Weinstein, Getz, Ratener, & Domoto, 1982; Zabin & Melamed, 1980) that used alone it may exacerbate distress, while if combined with parenting behaviors oriented toward facilitation of active child coping, it may enhance adaptation. Ignoring and restraining were defined as more negatively oriented maternal behaviors. Finally, agitation was defined to measure maternal expressions of distress and/or anxiety in the situation. Four constituent behaviors for each class, developed in the same manner as the child behaviors, are defined operationally in Table 1. It should be noted that informing was restricted to providing information relevant to the current medical situation, distracting was defined as engaging the child in an interaction that precluded focusing on the medical situation, and ignoring included maternal behavior that would require the child to interrupt the mother in order to get her attention.

Medical status. After seeing each patient, the examining physician entered the child's diagnosis and rated its severity on a 10-point scale ranging from *entirely trivial* to *imminently life-threatening*.

Procedure

Subjects were approached in the clinic's general waiting area after checking in for their scheduled appointments. After obtaining informed consent, the experimenter administered the Background Information Interview form, followed by the other mother and child questionnaires.

The videotaped observation period began when the receptionist called mother and child into the examining room, and ceased when the physician entered the room. Videotaping was continued during the examination, and results of these observations will be reported separately (Greenbaum, Cook, Abeles, Bush, & Melamed, 1985). Immediately after the examination, the physician completed the diagnostic severity rating.

The DPIS was used to rate all videotapes that included at least 5 min of uninterrupted interaction, up to a maximum of 10 min. A time-date generator was used to superimpose an elapsed-time digital clock onto the tapes without obscuring the visibility of subjects. Observers then used this clock to make instantaneous scan ratings (Altmann, 1974) of the 10 DPIS categories every 5 sec. That is, every 5 sec, observers rated whether each of the 10 behavior classes was being engaged in at that moment. A response-class approach was used in observational scoring of the videotaped sequences: The behavior was scored as having occurred if any of its four specific constituent behaviors were observed at the scanpoints. The specific constituent behaviors were not scored separately. The 5-sec interval was chosen to minimize the frequency of scorable behaviors occurring but not being scored due to onset and offset between scanpoints.

Questionnaire Reactivity

The possible reactivity of questionnaires and interviewing on observed interactions was evaluated by collecting data from an additional 15 dyads to whom only the consent form was administered prior to videotaping. Their DPIS scores were compared to the 50 subjects who underwent the full research protocol. Frequency scores for the 10 categories were contrasted using both multivariate analysis of variance (MANOVA) and univariate *F* tests. None of the contrasts were statistically significant at the .10 level. Thus no evidence was found for questionnaire reactivity on DPIS behaviors.

RESULTS

After examining the demographic characteristics of the sample dyads, including the children's medical status, patterns of association among self-

report measures of coping style and anxiety were evaluated. Hypotheses regarding relationships among child and parent behaviors observed on the DPIS were evaluated, both by examining the pattern of univariate correlations between pairs of behaviors, and by analyzing the canonical correlations between the four child and the six mother behavior categories. Age trends in patterns of mother-child interaction were tested by entering child age into multiple regression equations. Finally, univariate correlation coefficients were computed between demographic and self-report variables and observed behaviors, in order to evaluate the predictability of actual parenting behaviors from questionnaire data. The results indicate that the DPIS is reliable and valid for studying mother-child events. The maternal use of informing and of distracting were associated with children's exploration of the treatment room and prosocial behavior. Children exhibiting these behaviors were observed to show less distress. The behavior of younger children (under 5 years, 9 months) showed a significantly greater degree of association with mothers' use of reassurance and information provision, than was found among older children.

Background Variables

Demographic and medical status characteristics of the 50 dyads are presented in Table 2. The sample was reasonably balanced with respect to age, sex, and severity of diagnosis. Most of the children had previous medical ex-

TABLE 2
Sample Characteristics: Demographic and Medical Status

	4-6 Years	6-8 Years	8-10 Years							
Age	18	16	16							
	Male	Female								
Sex	30	20								
Previous Medical Experience	Experience	No Experience								
Surgery	34	16								
Hospitalization	40	10								
Shands clinics	42	8								
Other outpatient	38	12								
	Gastroenterology	Urology	Elective Surgery	Infectious Diseases						
Clinic attended	1	16	23	10						
	Least Severe				Most Severe					
	1	2	3	4	5	6	7	8	9	10
Severity of diagnosis	0	7	9	7	4	5	5	5	1	1

perience. Boys and girls were represented in similar proportions across age levels and medical status categories and were similar on all questionnaire measures of (their and their mothers') anxiety and mothers' coping style. Children's age was not found to be significantly related to their medical status or levels of self-reported fear, nor was it related to maternal reports of coping style or anxiety or mothers' ratings of their children's current anxiety levels.

Maternal Self-Report Variables

Mothers who rated themselves as highly anxious on the 4-point scale rated their children as more anxious as well ($r = .42, p < .01$), and mothers reporting more medical fears expected worse reactions from their children during the impending exam ($r = -.27, p < .05$). High maternal state and trait anxiety were associated with their giving poorer ratings of children's handling of previous medical experiences ($r = .29, p < .05$, and $r = .48, p < .001$, respectively). Mothers' coping styles as reported on the coping questionnaire were unrelated to their anxiety levels and to their ratings of their children's anxiety. Maternal coping style and self-report of anxiety were not found to be significantly correlated with physician's ratings of the children's illness severity.

DPIS Reliability

Interobserver reliability of the DPIS was evaluated by comparing independent ratings made by trained observers, using a repeated-measures ANOVA procedure (Winer, 1962). Reliability coefficients were computed for each DPIS category. From three to five observers rated each videotape. The ratings of three randomly selected observers for each subject were used for reliability estimation. In addition, the three best-agreeing observers were selected for each dyad by means of a least-squares procedure, and reliability coefficients were also computed for these data. These "optimally reliable" ratings (i.e., the mean of the three best-agreeing observers) were used in data analyses. Relative frequencies, calculated as total frequency divided by number of scanpoints, were used instead of total frequencies, thereby adjusting for differences in length of observation periods.

The DPIS was found to be highly reliable for observational measurement of mother-child interactions. Obtained interobserver reliability coefficients are given in Table 3. High concordance was found for all categories except restraining. This may have been attributable to the low observed incidence and short duration of restraining behaviors during videotaping. Reliability coefficients were similar for the "optimized" and "nonoptimized" methods, making it likely that this instrument could be successfully used by a single rater.

TABLE 3
DPIS Interrater Reliability Coefficients

	<i>Optimized Coefficient^a</i>	<i>Nonoptimized Coefficient^b</i>
Child behavior categories		
Attachment	.97	.94
Distress	.77	.80
Exploring	.91	.92
Prosocial	.95	.94
Parent behavior categories		
Ignoring	.99	.97
Reassuring	.93	.96
Distracting	.92	.96
Restraining	.60	.34
Informing	.98	.96
Agitation	.95	.96

^aBased on three raters showing greatest agreement for each subject dyad.

^bBased on randomly selected raters for each subject dyad.

Observed Behavior

Relative frequencies with which mothers and children engaged in each of the DPIS behavior categories are shown in Table 4. As noted, maternal restraining was observed somewhat rarely; 16 mothers (approximately one third of the sample) were not observed restraining their children at any time during the pre-exam period. The substantial magnitudes of the standard deviations and ranges, relative to the means, indicated that considerable intersubject variability was detected among the 10 behaviors measured.

Child behaviors measured on the DPIS were found to be relatively independent, except for distress. Children who showed high distress engaged in less exploration of the medical situation ($r = -.28, p < .05$) and were less likely to engage in prosocial activities ($r = -.34, p < .01$).

Among parent behavior categories, ignoring was inversely related to the four other parent behaviors with which it could not co-occur: reassuring ($r = -.30, p < .05$), distracting ($r = -.59, p < .0001$), restraining ($r = -.39, p < .01$), and informing ($r = -.34, p < .05$). It should be noted, however, that ignoring was scored only when a mother was actively engaged in activity precluding her attending to her child; that is, it was not scored as the mere absence of other scorable maternal behaviors. Mothers who spent more time ignoring their children also tended to manifest more agitation ($r = .31, p < .05$). High rates of agitation were also associated with less frequent provision of information ($r = -.28, p < .05$).

TABLE 4
Means, Standard Deviations, and Ranges for DPIS Behaviors

	<i>M</i>	<i>SD</i>	<i>Range</i>
Child behaviors			
Attachment	39.21	26.59	4.2-100
Distress	32.78	24.76	0-94.60
Exploring	12.27	13.55	0-63.57
Prosocial	25.82	25.07	0-97.53
Parent behaviors			
Ignoring	33.80	31.84	0-100
Reassuring	8.63	18.65	0-95.77
Distracting	20.85	22.33	0-95.10
Restraining	2.18	3.40	0-15.87
Informing	11.05	14.91	0-57.83
Agitation	21.07	26.64	0-95.13

Note. DPIS scores represent proportional frequencies of occurrence relative to number of scanpoints observed for each dyad.

The three strongest correlations between mother and child behaviors, as shown in Table 5, involved mother and child behaviors that, while entirely free to occur or not independent of each other, could readily occur together simultaneously. Thus maternal use of distraction was highly correlated with children's engagement in prosocial behaviors. Both were scored when, for example, mother and child were playing together or discussing nonmedical topics. Maternal information provision and child exploring also co-occurred, such as when the child asked a question relating to the clinic and the mother answered. Maternal reassurance and child attachment also were observed to co-occur, such as when the child sat in mother's lap and was cradled.

Several maternal behaviors were significantly associated with child distress. Both agitation and reassurance covaried positively with distress, whereas distracting was associated with children exhibiting fewer distress behaviors. In addition, children whose mothers ignored them more engaged in less exploration and prosocial behavior.

Patterns of relationships between combinations of maternal and child behaviors were analyzed by means of canonical correlation. Four significant orthogonal canonical functions, the maximum possible with the number of variables used in this analysis, were generated by this procedure. These functions are shown in Table 6, along with the correlation of each of the original behavior variables with each function. Given the relatively small sample size, interpretation of the canonical functions is based on these correlation coefficients (Darlington, Weinberg, & Walberg, 1973). The first canonical function indicated that high rates of maternal distracting and low rates of maternal ignoring were associated with high rates of child prosocial behavior and

TABLE 5
Correlations Between DPIS Parent and Child Behavior Categories

<i>Parent Categories</i>	<i>Attachment</i>	<i>Distress</i>	<i>Exploration</i>	<i>Prosocial</i>
Ignoring	-.17	.24	-.30*	-.46***
Reassuring	.56***	.39**	-.21	-.17
Distracting	-.06	-.31*	-.05	.77***
Restraining	-.21	-.20	.20	.21
Informing	-.12	-.05	.57***	-.11
Agitation	-.26	.32*	-.02	-.07

* $p < .05$. ** $p < .01$. *** $p < .001$.

TABLE 6
Canonical Functions: Relationships Between Parent and Child Behaviors

<i>Canonical Function</i>	<i>Parent Behaviors</i>		<i>Child Behaviors</i>	
1 ^a	Distracting	.72 (.91)	Prosocial	.86 (.97)
	Reassurance	-.46 (-.36)	Distress	-.23 (-.60)
	Ignoring	-.26 (-.52)	Attachment	-.12 (-.24)
	Informing	-.26 (-.09)	Exploration	-.01 (.03)
	Agitation	-.10 (-.13)		
2 ^b	Restraining	.03 (.24)		
	Informing	.68 (.79)	Exploration	.86 (.95)
	Reassurance	-.55 (-.48)	Attachment	.30 (-.50)
	Ignoring	-.48 (-.24)	Prosocial	.09 (-.11)
	Distracting	-.39 (-.15)	Distress	.01 (-.22)
3 ^c	Agitation	.27 (.10)		
	Restraining	.01 (.13)		
	Reassurance	.75 (.74)	Attachment	.81 (.61)
	Restraining	.38 (.44)	Distress	.73 (.33)
	Agitation	.36 (-.05)	Exploration	.67 (.23)
4 ^d	Informing	.29 (.27)	Prosocial	.63 (.17)
	Ignoring	-.26 (-.69)		
	Distracting	.13 (.27)		
	Agitation	.89 (.82)	Distress	.90 (.70)
	Distracting	.61 (.16)	Attachment	-.58 (-.56)
	Ignoring	.48 (.27)	Prosocial	.41 (.10)
	Informing	.35 (-.09)	Exploration	-.05 (-.19)
	Reassurance	.29 (-.07)		
	Restraining	-.21 (-.44)		

Notes. Standardized coefficients are reported for each behavior for each canonical function. These coefficients describe the composition of the canonical variates. The coefficients given in parentheses represent the correlations of each of the original behavioral variables with the respective canonical variate.

^aCanonical correlation = .82, $R^2 = .67$, $p < .001$.

^bCanonical correlation = .69, $R^2 = .48$, $p < .001$.

^cCanonical correlation = .66, $R^2 = .43$, $p < .001$.

^dCanonical correlation = .51, $R^2 = .26$, $p < .01$.

low child distress. Thus maternal attention and distraction of the child were related to more positive child adjustment.

The second canonical function showed that mothers who provided high rates of information and little reassurance had children who spent more time engaging in exploration and relatively little time in attachment behaviors. Here a parenting approach that emphasizes helping the child with instrumental coping rather than with emotional expression is found in mothers whose children do in fact show more instrumental coping and less attachment. The third canonical function revealed a relationship of high rates of maternal reassurance and low ignoring with children appearing to be highly attached. Parenting that emphasizes attending to the child and providing high rates of emotional support, then, was not found to be associated with adaptive child coping behaviors but with high levels of reliance on mothers. The fourth canonical function indicated that maternal agitation was associated with high rates of child distress and low attachment. Children whose mothers were manifestly upset, then, behaved maladaptively (highly distressed) and in addition were unlikely to turn to their mothers for emotional support.

Relationship of Sex, Medical Status, and Age to Observed Behavior

Sex was related to only one DPIS behavior: Mothers restrained their daughters more than their sons ($r = -.27, p < .05$). However, since restraint occurred infrequently and had the lowest reliability, interpretations should be made with caution. As children's age increased, prosocial behavior was observed less frequently ($r = .35, p < .05$). Mothers tended to ignore younger children less ($r = .30, p < .05$) and to distract them more ($r = -.38, p < .01$). No significant correlations were found between illness severity, as measured by the examining physicians' ratings, and rate of occurrence of any DPIS behavior.

A series of multiple regression equations was used to examine age trends in the patterns of mother-child interaction. Each behavior that contributed significantly to one of the four obtained canonical functions was used as a dependent variable. Predictor variables for each equation consisted of child age, each behavior of the other interactant that contributed significantly to the canonical function from which the dependent variable was selected, and the corresponding interaction terms. In this manner, data were analyzed as to whether child's age affected the relationships between parent and child behaviors identified in each of the canonical functions. Significant age effects were found only for the second and third functions. Specifically, age mediated the positive relationship, revealed by the second canonical function, between maternal informing and child exploration, $F(1, 42) = 4.40, p < .05$. The strongest association between these behaviors was found in children

younger than 5 years, 9 months (the youngest third of the subjects), though they were significantly correlated at all age levels.¹

Analysis of the third canonical function revealed that reassurance was most strongly predicted by high levels of attachment among children who also showed high levels of distress, $F(1, 28) = 6.11, p < .05$. Again, this relationship was strongest in the youngest group of children, $F(1, 28) = 5.15, p < .05$.

Relationship of Questionnaire Measures to Observed Behavior

Children whose mothers predicted that they would handle the impending exam well engaged in more exploration ($r = .36, p < .01$) than did children expected to adjust less well. Mothers reporting higher trait anxiety spent more time ignoring their children ($r = .36, p < .01$), but no direct correlations were found between maternal trait anxiety and observed child behaviors. Mothers who reported using more problem-focused coping in connection with their child's current health crisis used more reassurance with their children than did mothers who reported using little problem-focused coping ($r = .37, p < .01$).

DISCUSSION

The results of this study support the importance of looking at observational data on specific interactions between mothers and their children in examining the adaptation of children to a stressor, particularly medical treatment. The pattern of mother-child interaction was found to be important; it is not adequate simply to assess maternal behaviors without considering the interactive context established by the behaviors of both members of the dyad.

Results provide preliminary support for the usefulness of the DPIS as an instrument with which to measure these interactions. Interrater reliability was found to be adequate. Child behavior categories, based on models describing infants' behavior in a strange situation, appeared to measure independent but interrelated behavioral systems, suggesting the validity of an upward extension of Bretherton and Ainsworth's (1974) constructs. Parent behaviors were found to be related to both adaptive and maladaptive child responses. Furthermore, the DPIS was found to be sensitive to complex patterns of interaction involving more than one child and/or parent behaviors.

¹Follow-up tests of the results of the regression analysis consisted of ANOVAs based on trichotomized variables (the three levels of age were: 4 years, 1 month–5 years, 8 months; 5 years, 9 months–7 years, 3 months; 7 years, 4 months–9 years, 1 month). In these analyses there was a significant Age \times Informing interaction, $F(2, 41) = 6.85, p < .003$.

In addition to describing the DPIS and establishing some of its psychometric properties and its applicability to the medical context, results of this study also provided information relevant to hypotheses regarding the adaptiveness of various mother-child interaction patterns. As predicted from attachment theory, high rates of exploration were associated with low rates of distress. Engagement of the fear-wariness system, then, seemed to inhibit instrumental coping, just as it has been found to do in infants. Furthermore, crisis theory was useful for predicting which parents would best facilitate children's instrumental coping. Mothers who were agitated provided less information and ignored their children more, suggesting a pattern of parenting rendered less effective by the disorganizing influences of maternal anxiety. On the other hand, maternal information provision together with low rates of reassurance was found to be associated with high rates of child exploration and low rates of attachment. Thus instrumental coping was observed most often in children whose mothers' parenting behaviors were well organized in terms of supporting the child's coping efforts (information provision) rather than emphasizing emotional expression (reassurance).

Another adaptive coping pattern observed in children consisted of high rates of prosocial behavior along with low rates of distress. This pattern was also consistent with the attachment model, according to which these systems are likely to be related inversely. This pattern was most likely to be seen in children whose mothers often distracted them and infrequently ignored them. Again, both interactants display an orientation toward a particular coping strategy (distraction, focusing on nonmedical topics and activities) and away from emotional expression (distress and attachment). These observed patterns of interaction support the hypothesis that parenting (i.e., use of distraction or informing) that encourages active coping, along with low rates of ignoring, would be associated with children's engaging in more coping behaviors and fewer distress responses.

On the other hand, mothers whose parenting did have a more emotive emphasis (i.e., agitation, ignoring, reassurance) were likely to have children who showed more maladaptive responses. Mothers who used high rates of reassurance and infrequently ignored their children had children who predominantly exhibited attachment behaviors. An even more maladaptive pattern was found with mothers who manifested high rates of agitation. Their children were likely to be distressed but to be unlikely to exhibit attachment behaviors. This pattern was consistent with the emotional contagion hypothesis that anxious mothers would have anxious children. Alternatively, it may be the case that upset children who show little attachment are themselves the source of "contagion," eliciting maternal anxiety and in turn inhibiting more effective parenting behaviors. Further research will be needed to evaluate these alternative explanations.

Age also affected these relationships. Reassuring mothers had children

with high levels of attachment, particularly in the youngest group of children, and especially if they were high in distress. This suggests that reassurance-attachment interactions, which occurred frequently in most dyads, were more common with younger children and may have increased in response to these children's distress. On the other hand, those mothers who provided information and were not overly reassuring had children who engaged in high rates of exploration. As predicted, this relationship was strongest among the youngest children, suggesting that older children may have been more likely to do some of their exploring independent of maternal instigation or participation. Age trends in patterns of interaction clearly showed the behavior of younger children (less than 5 years, 9 months) to be more interdependent with maternal behavior than for older children (above 7 years, 10 months). Older children engaged in more coping behaviors independently of their mothers. For example, mothers' informing and children's exploring both were observed as often in younger-child as in older-child dyads. However, these behaviors were significantly more highly correlated in the younger-child dyads. Similarly, the frequencies of distress, attachment, and reassurance were not found to be age-related. However, rates of maternal reassurance and child attachment were most highly correlated in distressed children, particularly among the younger children. That is, reassurance-attachment interactions appeared to be engaged in most often in the younger-child dyads as a means of coping with distress.

Although an attempt was made to find questionnaire measures that might predict mother and child interactive behaviors, measures used in this study had only weak relationships with observed behavior. Self-reported maternal state anxiety and hospital fears were not related to what either mothers or children actually did in the examining rooms. This supported the premise that it is essential to look at behavior in the medical setting, rather than assuming parent or child behavior to be consistent with questionnaire self-report. We did find that mothers who were high in trait anxiety tended to ignore their children more, and that mothers reporting frequent use of problem-focused coping reassured their children more. It is impossible to know, on the basis of these data, whether these correlations represent general characteristics of mother-child relationships, or if they are specific to stressful (medical) situations. Further research might address this distinction, which could be important in identifying mothers at-risk for dysfunctional parenting with certain children under certain circumstances. It also was found that children engaged in more exploratory behavior if their mothers expected them to react well during the upcoming exam. These data are not conclusive as to whether this represents an effect of positive maternal expectations, or if mothers' ratings provided an index of children's capacity for active coping with a stressful situation.

One shortcoming of the present investigation is that it is inconclusive

as to causal direction, as is true in any correlational study. Although causal direction may be inferred in a manner consistent with a priori theoretically founded hypotheses, alternative explanations are plausible. Further analysis, employing lag sequential analysis models (Budescu, 1984; Cook & Greenbaum, 1985), will permit evaluation of whether temporal patterns and conditional probabilities in the observational data are consistent with our inferences. Further research is also underway to replicate the composition of the canonical variates obtained in this study in order to determine whether the dyadic interaction patterns extracted by these analyses are in fact robust. Research relating patterns of dyadic interaction during the waiting period with child cooperativeness and upset during the actual examination procedures, including venipuncture, will be reported in a follow-up article. Fuller support regarding the external validity of the DPIS await the results of these studies. In addition, research is needed to identify differences in dyadic interaction patterns between stressful and nonstressful situations, and among various stressful contexts, in the manner described by Bronfenbrenner (1977). Study of interactions across repeated clinic visits will allow for longitudinal validation of cross-sectional age trends suggested by the current data.

These results, together with ongoing and planned research using the DPIS, may provide the basis for a systematic and empirical approach to evaluating parent-child interaction in a stressful environment. The most directly useful application of these findings is probably the identification of dysfunctional interaction patterns. In addition, these patterns may provide a means of recognizing dyads at-risk for exacerbating the child's disruptiveness and anxiety during the impending medical procedure, for strengthening learned aversions and maladaptive attitudes toward health care, and perhaps for more general interference with the child's development of coping competencies. These findings provide some preliminary information about interactive patterns that appear to be facilitative of child coping in this setting, and about the age-specificity of parenting behaviors that are most appropriate. This information may be useful for identifying parents likely to be able to help the child if given an active role in the child's health care (e.g., in presurgical preparation or in attending to the child during a stressful procedure), as well as providing models for the development of parenting skills training programs.

In summary, results of this study indicate that the DPIS is a reliable and valid observational instrument for the study of parent-child dyadic interactions in a stressful medical situation. The finding that there were consistent interaction patterns suggests that "simultaneous interactional events" may be an appropriate and measurable unit of analysis. Results were supportive of the applicability of attachment and crisis theories, as well as the emotional contagion hypothesis, to 4- to 10-year olds in a medical setting. In fact, it also was found that demographic and self-reported dispositional variables showed only modest relationships with observed behavior. Finally, results

provided a database for hypotheses regarding which parental behaviors are most and least likely to be associated with adaptive child responses to medical stressors.

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